

REMARKS

Claims 1-23 and 27-31 are currently pending in the application. By this amendment, claims 24-26 are canceled without prejudice or disclaimer. Claims 27-31 are added for the Examiner's consideration. Support for the added claims 27-31 is found in at least Figures 1-2B and at page(s) 8-10 of the present specification. The specification is also amended to correct a minor grammatical error. No new matter is added. Reconsideration of the rejected claims in view of the above amendments and the following remarks is respectfully requested.

Allowed Claims

Applicants appreciate the indications that claim 3 contains allowable subject matter. However, Applicants submit that all of the claims are in condition for allowance for the following reasons.

Prior Art Rejections

Claims 1, 2, 4-13, 15, 16, 18, 19 and 22 were rejected under 35 U.S.C. §102(b) for being anticipated by U. S. Patent No. 5,648,690 to Hinds. Claim 14 was rejected under 35 U.S.C. §103(a) over Hinds in view of U.S. Patent No. 6,215,206 to Chitayat. These rejections are respectfully traversed.

The invention is directed to a motor assembly for position wafer stages, WS, for example, for a lithography machine. The invention includes motors, e.g., an x motor and a y motor. The motors each include two parts, for example, a magnet and a coil. The x and y motors can each provide forces in the respective directions, in addition to the z direction. For example, the stage is moved by the x motor in the x direction and by the y motor in the y direction. In embodiments, as shown in Figures 2 through 2B, the coil of the first motor is attached to the base and the magnets of the first motor and the second motor are attached to the wafer stage. Of course, this can be reversed or other combination contemplated, as discussed in the specification. The stage moves relative to the base by at least one of the first force and the second force (x or y

force). The first part of the second motor is attached to the following stage, where the base and the following stage are different respective bodies. Again, it is noted that the second part of the second motor may be attached to the following stage, instead.

Now, these elements simply are not shown in the Hinds reference, as submitted by the Examiner. It is true that the Hinds reference shows two motors 10 and 12 positioned on a surface 15 of a platform 14. However, unlike the present invention, neither the configuration nor placement of these motors is remotely similar to that of the claimed invention. In particular, Hinds shows a system of linear or induction motors operating such that control of movement of a shuttle in the plane can be finely regulated, and the angular movement can be restrained. The motors are in a single plane and do not have any components, which are attached to the shuttle. That is, the Hinds apparatus does not show a base to which the first part of the first motor is attached, a stage to which is attached the second part of the first motor and the second part of the second motor, and a second stage to which the first part of the second motor is attached

Referring to col. 4 and Figure 1, it is clearly described and shown that the motors 10 and 12 are positioned in a single plane on the platform 15. (See also, col. 2, lines 50-55.) The motors 10 and 12 are positioned orthogonal to each other to effect movement in two orthogonal directions of the shuttle (See, also col. 2, line 45.) The motors are only attached to the base. (See, Figure 1 and col. 4.) As further discussed at col. 4, more specifically, the system includes

[a] linear motor system for providing XY motion, namely compound orthogonal motion comprises a first linear motor 10 directed for effecting movement of an element 11 in a first of two orthogonal directions, namely the x direction. A second motor 12 includes an element 13 directed in a second orthogonal direction, namely the Y direction. The motors 10 and 12 are mounted on a base element 14 so that the respective motors 10 and 12 operate in a single plane. The elements 11 and 13 thus move in their respective orthogonal directions x and y respectively in a single plane over the surface or platform 15. The base element 14 includes a flat surface 15 which is preferably made of iron or some other magnetic material.

With this configuration, the shuttle 16 is capable of movement over the surface 15 under the interaction of the elements 11 and 13.

In fact, unlike that of the presently claimed invention, it is submitted that the elements 11 and 13 are not even attached to any component. For example, it is clearly disclosed at col. 5, lines 10-11, that each of the elements 11 and 13 are themselves suspended on air bearings. This is effected by a balance between magnetic forces and air pressure forces between the element 18 and the armature 19. However, it is acknowledged that the motor 12 includes a motor primary or armature 17 which is built into part of the steel base plate constituting the surface 15. The element 13 which is movable is illustrated in FIG. 3 in the form of an element 18 which runs over an elongated armature which is stationary relative to the motor primary 17 of the motor 12. The element 18 is affixed at its leading end to the element 13. Thus, it is apparent from the Hinds specification and accompanying figures, that the motors do not have a first part and a second part mounted in the same or even remotely similar configuration as that of the claimed invention.

It is also submitted that the Hinds reference cannot perform the same steps as that of the presently claimed invention. Basically, since the Hinds reference does not have the same elements and configuration thereof, this reference cannot inherently or otherwise have all the features of the presently claimed methods. For example, in the claimed invention, the stage is driven by, driving the stage by (a) a first force produced by a first motor including a first part and a second part that interacts with the first part; and (b) a second force produced by a second motor including a first part and a second part that interacts with the first part of the second motor. The first part of the first motor and the first part of the second motor are separate and the first part of the first motor is attached to a base that supports the stage and the first part of the second motor is attached to a different body from the base. These features, as discussed above, are not shown or suggested by the Hinds reference.

Instead, in operation, Hinds, as an important aspect, has a pair of air bearings in the leading edge of each of the elements 11 and 13. This provides a balance to the shuttle so that angular movement is limited. Also, in a head portion 20 of the element 13 there is a magnet 21

which acts as a preload to attract the shuttle 16 towards the interface 22 between the leading end of element 13 and the face 23 of the shuttle 16. There is also a pair of air bearing outlets 24 and 25, which act to repel the shuttle 16 from the face of the element 13. In this manner, the balancing between the magnetic attraction and the air repulsion acts to create an air bearing between the shuttle 16 and the leading end of the element 13. A similar air bearing is developed on the interface between face 26 of the shuttle and face 27 of the element 11.

As to the dependent claims, Applicants submit that the dependent claims are dependent from distinguishable base claims and are also distinguishable from the Hinds reference. Additionally, Applicants submit that subject matter of the dependent claims is also distinguishable on their own merits. For example, Hinds does not show (i) at least two stages (claim 8), (ii) producing a third force perpendicular to a guide surface of the base (claims 15 and 21) or (iii) producing torque about the z axis that is perpendicular to a guide surface of the base (claim 20).

Applicants further submit that the Chitayat reference does not show the features, which are missing, from the Hinds reference. Additionally, the Examiner uses the Chitayat reference for the proposition that a torque is produced about the z axis; but Applicants submit that the Hinds reference teaches away from movement in the third axis, one of ordinary skill would not have combined the Chitayat reference with the Hinds reference. If such a combination were made, this would clearly destroy the intended function of Hinds; namely, restraining the angular movement of the shuttle.

In view of the above, Applicants respectfully request that the rejection over claims 1-23 be withdrawn.

Added Claims

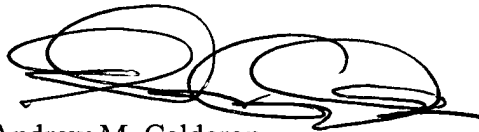
Claims 27-31 are added for the Examiner's consideration. These claims are dependent from distinguishable claim 1 and are also in condition for allowance. In addition, Applicants submit that these claims include allowable subject matter and are allowable on their own merits. For example, none of the references show (i) a second stage including at least one arm that

extends in the y direction and includes the first part of the second motor, (ii) a gap between the stage and the second stage, (iii) a levitation device as recited in claim 31 or (iv) underside slots for housing the second part of the first motor and the second part of the second motor.

CONCLUSION

Applicants appreciate the indication that claim 3 contains allowable subject matter; however, in view of the foregoing and remarks, Applicants submit that all of the claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue. The Examiner is invited to contact the undersigned at the telephone number listed below, if needed. Please charge any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 23-1951.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Andrew M. Calderon', with a stylized, looping flourish at the end.

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